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MEDICAL NEWS LETTER

Vol. 40

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No. 9

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Policy

The U. S. Navy Medical News Letter is basically an official Medical Department publication inviting the attention of officers of the Medical Department of the Regular Navy and Naval Reserve to timely up-to-date items of official and professional interest relative to medicine, dentistry, and allied sciences. The amount of information used is only that necessary to inform adequately officers of the Medical Department of the existence and source of such information. The items used are neither intended to be, nor are they, susceptible to use by any officer as a substitute for any item or article in its original form. All readers of the News Letter are urged to obtain the original of those items of particular interest to the individual.

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Change of Address

Please forward changes of address for the News Letter to: Commanding Officer, U. S. Naval Medical School, National Naval Medical Center, Bethesda 14, Md., giving full name, rank, corps, and old and new addresses.

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The issuance of this publication approved by the Secretary of the Navy on 28 June 1961.

ARMED FORCES RADIATION BIOLOGY
and
ATOMIC MEDICINE PROGRAM

CDR John H. Schulte MC USN, Director, Special Weapons Defense
Division, BuMed

Military interest in the field of radiation biology is directed toward the protection of personnel from radiation produced during an enemy attack in which nuclear weapons are used, and from the radiation produced by the nuclear reactors which are being used by the Armed Forces to generate electrical power for propulsion, operation of equipment, heat, and light. Therefore, military research in this field must concern itself with the effects upon man of exposure to single large doses of mixed ionizing radiation produced by a nuclear detonation, the more prolonged exposure to intermediate doses of radiation produced by radioactive fallout, and the continuous occupational exposure to the low levels of radiation emanating from shielded nuclear reactors.

In addition, the Medical Departments of the Armed Forces have been charged by law with the responsibility to provide medical care and treatment for military personnel and their dependents. In compliance with this charge, the Medical Departments of the Armed Forces can and do utilize radiation generating equipment, radiation sources, and radioisotopes for diagnosis and therapeutics. The larger medical facilities of each of the Armed Forces can also institute a number of clinical research projects in radiation biology with the approval and within the budgetary limits of their parent Medical Departments. Although the assigned responsibilities in this field are the same for all three of the Armed Forces, each service must be treated individually in a description of its specific organization and in its method for accomplishing its assigned mission. Variation among the services is a natural result of their divergence in function; for example, widely different problems for defense against a nuclear attack are presented by a ship at sea, an operational air base, and a troop training center.

Since there is a divergence in function among the services, it is necessary for each of the services to use different approaches to and methods for personnel protection from radiation. To prevent unnecessary duplication of research effort among the three services, the Department of Defense has established the Defense Atomic Support Agency (DASA). This agency approves, supervises, and financially supports the research in nuclear weapons effects among the three services; and awards contracts to universities and civilian laboratories for research in this field which is beyond the capabilities of the service facilities. When functioning in this capacity, DASA can prevent duplication of research endeavors which might otherwise occur.

Navy Radiation Biology and Atomic Medicine Programs

Within the Department of the Navy responsibilities for the program for defense against the effects of nuclear weapons, the nuclear propulsion program, and

the nuclear medicine program have been distributed among several Bureaus. The Chief of Naval Operations exercises policy control in the fields of organization, equipment, and personal qualifications, assignments, and training in the program for defense against nuclear weapons and the nuclear propulsion program.

The Bureau of Ships is responsible for:

- a. Development of equipment for individual and collective protection of personnel from the effects of nuclear explosions.
- b. Development of equipment and shielding for the protection of personnel from radiation emanating from nuclear reactors.
- c. Development of radiac instruments.
- d. Investigation of radiological contamination and the development of methods for decontamination.
- e. Development of reactor safety programs.
- f. Development of procedures for the disposal of radioactive waste materials.

The Bureau of Medicine and Surgery is responsible for:

- a. Establishment of radiation tolerances for exposure to nuclear detonations.
- b. Investigation of the physiological effects of exceeding those tolerances.
- c. Development of procedures for the treatment of mass casualties resulting from exposure to nuclear detonations.
- d. Establishment of radiation tolerances for occupational exposures to nuclear reactors, radiation generating equipment, and radioactive materials.
- e. Investigation of the physiological effects of exceeding the tolerances for occupational exposures to radiation.
- f. Development of procedures for the treatment of occupational over-exposures to radiation.
- g. Clinical use of radiation generating equipment and radioisotopes for diagnostic and therapeutic procedures for military personnel and their dependents, in accordance with the highest standards of practice in the medical profession.
- h. Investigation of physiologic functions in health and in disease states utilizing radioactive trace elements.

To fulfill its responsibilities, the Bureau of Medicine and Surgery exercises management control over a number of research institutes and laboratories, and supervises the operation of isotope clinics in all its major hospitals. In addition, the Bureau supplies technical assistance in this field to activities which are under the management control of other naval bureaus.

National Naval Medical Center

The National Naval Medical Center, located at Bethesda, Md., consists of the Naval Medical Research Institute, the Armed Forces Radiobiology Research Institute, the Radiological Exposure Evaluation Laboratory, the Navy Toxicology Unit, the Naval Hospital, the Naval Medical School, and the Naval Dental School; and is under direct management control of the Bureau of Medicine and Surgery. This medical complex is ideal in that it permits immediate and direct personal intercourse between the research scientist in institutes and laboratories, clinicians in the hospital, and instructors in the schools.

To accomplish its missions in the field of radiation biology and nuclear medicine, the various component activities of the National Naval Medical Center have a large variety of X-ray equipment ranging in size up to and including a 200 KV X-ray therapy unit. These activities also hold U.S. Atomic Energy Commission licenses to operate a pulsed nuclear reactor, a 5-watt nuclear reactor, a linear accelerator, a positive ion accelerator, a 2500 Curie Co^{60} whole body irradiator, a 1000 Curie Co^{60} teletherapy unit; and Atomic Energy Commission byproduct licenses to use radioactive sources with specific activities up to 10 Curies for any and all isotopes with atomic numbers from 3 to 37, for radioactive sources with specific activities up to 0.5 Curies for any and all isotopes with atomic numbers from 39 to 83, and for H^3 , Sr^{90} , I^{131} , Cs^{137} , Ir^{192} , Po^{210} , and Ra^{226} sources ranging in specific activity from 0.5 to 20.0 Curies.

Naval Medical Research Institute

The Naval Medical Research Institute (NMRI) is an integral part of the National Naval Medical Center. NMRI maintains an active and continuing research program in the fields of stress physiology, regulatory physiology, biochemistry, biophysics, preventive medicine, occupational medicine, aviation medicine and toxicology.

The studies in stress physiology include basic research into the physiological mechanisms which are effected by exposure to extremes of climate, methods for the prevention of heat casualties including the mechanisms involved in acclimatization, and methods for the treatment of heat casualties. Results of these studies are essential to the design of adequate bomb shelters for protection from the effects of a nuclear attack.

In the fields of biochemistry and toxicology as they are related to radiation biology, many studies of enzymatic activity are being conducted utilizing radioactive trace elements.

The biophysics research at NMRI is directed toward the biological effects of radiation, medical problems related to injury produced by ionizing radiation, treatment of injuries resulting from exposure to ionizing radiation, development of a chemical dosimeter, flash burns of the retina, and the effects of blast and the tolerance levels for blast in animals and man. The studies of biological effects are concerned primarily with the mechanisms of both acute and late death due to irradiation, and the determination of the dose of whole

body irradiation necessary to produce death in various animals in an attempt to determine the minimum lethal dose for man. Various cell-free splenic extracts which effectively reduce mortality are also being studied in an effort to ascertain the best form of treatment for radiation injuries.

Armed Forces Radiobiology Research Institute

The Armed Forces Radiobiology Research Institute (AFRRI) is located in the National Naval Medical Center, Bethesda, Md. Although it is a triservice research facility and is funded by the Defense Atomic Support Agency, it comes under management control of the Navy Bureau of Medicine and Surgery.

AFRRI is a new research institute. Construction of the facility began in 1959, and the reactor went critical for the first time in 1962. The AFRRI reactor is quite unique in that it can be operated at a steady state energy level up to 100 kilowatts. It can also be pulsed to produce a power release of 18 megawatt seconds for a period of 13 milliseconds. Utilizing the reactor, AFRRI is capable of simulating the radiations generated by a nuclear detonation. Its research scientists can also study the effects of fast neutrons, thermal neutrons, and gamma radiation, singly and in combination, over a wide range of energies and doses.

AFRRI will also have a linear accelerator capable of producing electrons with energies from 10 kev to 30 Mev. When operating at 30 kw, this accelerator can produce 9.6×10^{13} neutrons per second with an energy peak at 2 Mev from a uranium target. When used for gamma irradiation, the linear accelerator will produce a dose rate of approximately 6×10^9 rads/hr at a distance of three inches when a one gram sample of an element with a high atomic number is used as the target.

Although the primary purpose of research at AFRRI is to study personnel protective measures, the institute has the capacity for research covering the entire field of radiobiology including nuclear medicine. Because of its ideal location, AFRRI can also produce a variety of short lived radioisotopes which are used for research in the other facilities at the National Naval Medical Center.

Radiation Exposure Evaluation Laboratory

Although the Radiation Exposure Evaluation Laboratory (REEL) forms a small part of the National Naval Medical Center, it has an extensive research program in radiation biology and nuclear medicine. This program includes investigations into:

- a. Effect of total body irradiation on the urokinase excretion in dogs.
- b. Variations in the excretion of urinary amino acids resulting from total body irradiation in doses from 100 r to 1200 r in groups of dogs.
- c. Variations in enzyme systems following exposure to ionizing radiation in rats.
- d. Variations in chromosomes following exposure to ionizing radiation in mice.

- e. I^{131} labeled tri-iodothyronine uptake by blood and the I^{131} thyroxine binding capacity of serum in association with the isotope clinic of the naval hospital.
- f. Site of absorption and mode of transport of vitamin B_{12} which contains Co^{57} , neohydrin and salyrcan containing Hg^{203} , Cr^{51} , and Au^{198} .
- g. Metabolic pathways of S^{35} labeled amino acid precursors.
- h. Relationship of neutron dose and the amount of induced Na^{24} and P^{32} activity in a coordinated study with the Armed Forces Radiobiology Research Institute.
- i. In vivo metabolism of C^{14} labeled freeze-dried homografts in association with the Tissue Bank of the Naval Medical School.

Naval Medical School

The Naval Medical School, which is a component of the National Naval Medical Center, maintains an active research program in the storage and use of preserved human tissues. A large part of this program involves the study of the in vivo metabolism of the collagen components of transplanted, freeze-dried homografts using tissues which have been tagged with C^{14} and/or H^3 . Another part of this program encompasses the study of the in vitro metabolism of various tissues during storage in the tissue bank. This part of the program is accomplished by utilizing a variety of radioisotopes.

Naval Medical Field Research Laboratory

The Naval Medical Field Research Laboratory (NMFRL) is located at Camp Lejeune, N. C. This laboratory is under the management control of the Navy Bureau of Medicine and Surgery and is partially funded by the Defense Atomic Support Agency of the Department of Defense.

In the field of radiation biology, the laboratory has a small but continuing research program directed toward the radiation effects resulting from exposure to the detonation of nuclear weapons and toward the development of equipment for use by personnel in the field for protection against the ionizing radiation produced by a nuclear detonation. To accomplish its mission, the scientific staff at NMFRL has the cooperation and support of the Marine Corps personnel stationed at Camp Lejeune for field studies.

U. S. Naval Radiological Defense Laboratory

The U. S. Naval Radiological Defense Laboratory (USNRDL), San Francisco, Calif., is under the management control of the Bureau of Ships and obtains financial assistance from the Defense Atomic Support Agency and technical assistance from the Bureau of Medicine and Surgery.

In addition to its research and development programs in the field of radiation detection instruments and equipment protection, NRDL has a variety of research studies in the field of radiobiology which include:

- a. Recovery and residual damage from exposure to repeated doses of X-irradiation in eleven mammalian species.
- b. Effects of irradiation on performance and behavior.
- c. Effects of radiation on gastrointestinal tissues.
- d. Radioprotective effects of drugs given prior to exposure.
- e. The effects of radiation on subcellular and immunological systems.

* * * * *

Navy Psychiatric Assessment
Program in the Antarctic *

CAPT J. E. Nardini MC USN (1), CDR R. S. Herrmann MSC USN (2),
CDR J. E. Rasmussen MSC USN (3). Amer J. Psychiat 110: 97-105,
August 1962.

The International Geophysical Year, 1957-1958, produced a research endeavor of heretofore unequalled magnitude. One part of this gigantic undertaking was the participation of the United States in large scale basic science studies aimed at increasing man's knowledge of the Antarctic. Seven bases were established in Antarctica in connection with this effort. While the scientific program was almost exclusively the responsibility of civilian investigators connected with the IGY, logistic support for the scientific personnel was provided by the United States Navy. The program was considerably reduced in scope following the International Geophysical Year; however, it has been continued to the present time under the sponsorship of the National Science Foundation and the National Research Council. The Navy's role in providing logistic support has remained essentially unchanged.

It has been the Navy's responsibility to transport the scientists and their equipment both to and within the Antarctic, to construct as well as maintain the bases and equipment, and to provide medical, dental, and commissary services required for what might be considered seven small communities. All the bases are totally independent and isolated from one another, as well as from the outside world, for approximately 6 to 8 months of the year. Even radio communication occasionally is cut off due to unfavorable weather conditions.

During the year immediately preceding the IGY, the Navy undertook the establishment of the initial Antarctic bases. This expedition was marked by an untoward event in that one man developed a frank and florid psychosis. As might be anticipated, the ensuing management problems were of considerable magnitude inasmuch as there were no provisions for adequately separating such a patient from the remainder of the group, and it was impossible to evacuate him from the Antarctic.

* Read at the 117th annual meeting of The American Psychiatric Association, Chicago, Ill., May 8 - 12, 1961.

As a result of this incident, the Bureau of Medicine and Surgery was requested to undertake a neuropsychiatric assessment of all personnel, military and civilian, who were scheduled to winter over during the International Geophysical Year as well as during the subsequent expeditions. It was necessary to begin the psychiatric assessment program on approximately 6 weeks notice; however, in spite of the pressure of operational commitments, an effort was made to approach the task both from a research and a clinical standpoint. The research endeavor has been devoted to developing criteria for psychiatric selection as well as to identifying psychological variables which influence performance in such extreme isolation. This article is limited to summarizing the results of the psychiatric assessment procedure with particular emphasis on small stations.

Evaluation Procedure. All personnel, military and civilian, are subjected to essentially the same assessment procedures, although the examinations are carried out at a number of different Navy activities. In addition to various attitude scales and psychological tests which are administered as part of the program of studying group function and interaction during the period of isolation, each man is required to complete an extensive biographical inventory.

Following the group testing procedure, each man is seen in an unstructured psychiatric interview. While the length of the interview was determined by the psychiatrist, a maximum of one hour is scheduled for this purpose. In most cases, the interview is completed in approximately 30 minutes; however, this time is occasionally exceeded when questionable cases are encountered. The completed biographical inventory is available to the psychiatrist at the time of interview and is used to obtain a rapid appraisal of areas in the individual's past personal history which might be worthy of some careful exploration. At the completion of the interview, the psychiatrist is requested to complete a form in which he summarizes the results of his examination and makes a rating on a 5-point scale as to the man's suitability for duty in the Antarctic.

Each man also is seen by a clinical psychologist who administers a Rorschach test and summarizes his findings on the same form used to record the results of the psychiatric examination. The psychologist also rates each man in terms of his suitability for Antarctic duty. Upon completion of the individual assessments, the psychologist and psychiatrist who conducted the examinations meet as a team and make a final appraisal of the subject which is based on a joint consideration of their individual findings. The final team rating, which often differs from the rating assigned by either examiner, is used as a basis for the formal recommendation as to the subject's psychiatric suitability for Antarctic duty.

Assessment Criteria. In any operational program of this nature, the isolation of objective criteria for use in making a psychiatric and psychological assessment constitutes a perennial methodologic problem of major proportions.

Because of operational requirements that psychiatric assessment programs be undertaken on short notice, it was not possible to conduct preliminary studies which would yield even crude criterion information. After a search of the limited literature which was available, a decision was made to focus upon

four primary areas in determination of psychiatric suitability for the Antarctic program. These areas were: motivation, history of past personal effectiveness, present ego strength and adequacy of defense mechanisms, and finally adequacy of interpersonal relationships. Thus, individuals who showed no obvious defects or weaknesses in these four areas were considered sufficiently stable to adjust in the Antarctic—or for that matter for almost any program of this nature.

Follow-up Data. The complexity of collecting follow-up data in this situation is astounding and at times extremely frustrating. On occasion, the forms for recording the information have been lost or destroyed in transit before the wintering-over period began. On other occasions, the pressure of a 16-hour work day precluded the collection of data in accordance with the pre-arranged schedule. However, in spite of these difficulties, information on the incidence of serious psychiatric disturbances has been obtained from all stations. Moreover, follow-up information concerning actual performance has been obtained on ten small stations as well as two of the larger stations.

Four sources of criterion data were built into the research design; peer nominations, supervisor performance ratings, medical symptom check lists, and debriefing interviews with personnel at the completion of their wintering-over experience. The peer nomination technic generally proved to be so psychologically threatening that it was discontinued as a routine technic. The symptom check lists yielded very little information on the group as a whole. However, the supervisor performance ratings, combined with information obtained from the interviews, present a relatively clear although gross picture as to the adequacy of each individual's psychiatric functioning during the wintering-over period. The officers in charge of stations were responsible for collecting ratings which were obtained during the wintering-over period.

Results

Incidence of Psychiatric Disorders. During the 5 years covered by the present program, there have been no documented cases of psychiatric illness, which clearly reached psychotic proportions, among the wintering-over personnel. Of the 6 men formally admitted to the sick list, only one had been through the psychiatric assessment procedures. This case was diagnosed as an emotional instability reaction. The remaining 5 men had been selected as last minute replacements for individuals who dropped out of the program for a variety of administrative reasons. Their diagnoses included 3 cases of relatively severe neurotic depression and 2 of anxiety reaction.

While the above data would indicate that the assessment program generally has been successful, it should not be construed as implying that there has been a complete absence of psychiatric disturbances in the Antarctic. Information obtained through debriefing interviews clearly indicated that acute emotional disturbances are not uncommon. This is particularly true at the smaller stations comprised of 15 to 40 men. There also is reason to believe that several men may have experienced brief near psychotic episodes. Examples

of such incidents are reported by Rohrer. Although these psychiatric problems may not be of sufficient magnitude to necessitate admission to the sick list or formal medical treatment, on occasion they create extremely tense and stressful situations for the remainder of the station personnel. With a few isolated exceptions, the groups appear to have spontaneously responded to the acute emotional disturbances with technics which closely resemble those of the classical therapeutic community.

Low grade depressions are prevalent during the 3-month period of darkness. Headaches which appear to be of psychogenic origin are frequently reported. While acute anxiety attacks are occasionally reported, these are relatively uncommon and usually related to specific situational factors beyond the individual's control. Not a single case of psychosexual disturbance or overt homosexual activity has been reported during the 5 years of this study. The functional backaches and gastrointestinal complaints so commonly found in the military services have rarely been observed among the wintering-over personnel. However, this is not surprising in view of the highly select nature of the population.

Relationship of Psychiatric Assessment to Performance. The assessment program has been successful in identifying and eliminating those individuals who will become totally ineffective under the stress of Antarctic isolation, or will require hospitalization for a psychiatric disorder, but it has been less effective in predicting precise levels of performance. While this finding certainly would be expected in view of the history of psychiatric assessment programs in general, the results nevertheless do show a significant positive correlation between prediction and performance.

Two separate approaches have been made to analyzing the relationship of psychiatric prediction and performance effectiveness. First, the performance of the military personnel at each of the ten small stations was evaluated on the basis of supervisory ratings. Secondly, the predictions were studied in terms of men falling at either extreme of the performance continuum (a), (b).

Table 1 includes ratings made on men at six stations. These stations were considered together because the subjects were rated on one form of the psychiatric rating scale (ratings from 1 to 5), while the men at the four remaining small stations were rated on a different scale (ratings from A to E). On the first scale, a rating of 3 was interpreted as "average"; a rating of C on the second scale indicated "can't decide whether superior or inferior." Because of a possible difference in examiner orientation, the data were summarized separately. Fairly substantial predictive validity for the psychiatric ratings at either end of the performance scale is indicated by tables which

- a. Analysis of this portion of the research data was made by Dr. E. K. E. Gunderson, and LT P. Nelson MSC USN at the U. S. Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.
- b. This analysis was undertaken by Dr. J. H. Rohrer, Georgetown University School of Medicine, using data which he and CAPT C. S. Mullin MC USN collected through debriefing interviews in the Antarctic.

accompany the article. The degree of relationship is shown roughly by the tetrachoric correlations of .41 and .66 which are statistically significant in spite of unequal distributions for the dichotomized prediction categories.

TABLE 1
Relationship of Psychiatric Screening Predictions to Performance
Deep Freeze 1957 and 1960

STATION	PERFORMANCE CATEGORIES	PREDICTION CATEGORIES			N
		INFERIOR OR POOR <3	AVERAGE 3	SUPERIOR OR OUTSTANDING >3	
1	High	0	2	2	4
	Low	2	1	0	3
2	High	3	3	3	9
	Low	1	8	1	10
3	High	0	4	6	10
	Low	4	4	2	10
4	High	6	3	1	10
	Low	5	4	1	10
5 and 6	High	4	6	6	16
Combined	Low	6	6	4	16
Total Small	High	13	18	18	49
Stations	Low	18	23	8	49
Proportion falling in High Performance Category		.42	.44	.69	
Combining Columns 1 and 2 versus Column 3:					
		AVERAGE, INFERIOR OR POOR 3 OR <3		SUPERIOR OR OUTSTANDING >3	N
	High	31		18	49
	Low	41		8	49
Proportion falling in High Performance Category		.43		.69	
r=.41					

Obviously, these results cannot be interpreted as demonstrating that the assessment procedures yield accurate predictions of effectiveness under conditions of Antarctic isolation. Rather, the data are considered to constitute positive and encouraging bench marks for the development of further criteria. Certainly, the results are sufficiently positive to warrant continuation of the program and further refinement of the assessment procedure.

Revised Screening Criteria. Through a process of repeatedly postulating the importance of specific motivational factors and personality characteristics, and constantly revising the conceptual formulations through debriefing interviews, it has been possible to gradually focus on what appear to be the more significant variables in adjustment to Antarctic isolation. Obviously, there is no one personality pattern which ideally suits an individual for assignment to a program such as Operation Deep Freeze. However, a number of positive and negative characteristics have been isolated during the past 5 years which now appear to be important in the psychiatric assessment of personnel for this duty. They are briefly summarized below:

Motivation. Positive motivation for Antarctic duty is not given as much weight as it was at one time in the assessment program. Many of the most successful men are not really sure why they volunteer. Among the more positive motivations are: save money, possible advancement in rate, and the challenge of an unusual experience. Unhealthy motivations—which, on the basis of past experience, are cause for disqualification—include the following: escape from marital conflict, transfer from an undesirable duty station, and immature search for adventure.

History of Past Personal Effectiveness. This variable has come to be considered one of the most important in the assessment of Deep Freeze personnel. Each man in the wintering-over party has a specific job which he must perform. In one sense, every man at a small station is dependent on every other man. Status is determined primarily by vocational effectiveness. The man who is not technically competent is both a source of threat to the well-being of the group and a source of interpersonal conflict. The technically competent individual may display considerable psychopathology during the wintering-over period and still be effective.

Ego Strength and Adequacy of Defense Mechanisms. Any evidence of potential for emotional decompensation, or history which is suggestive of possible decompensation during periods of stress in the past, is considered disqualifying. At the present time, much greater emphasis is placed on adequacy of defense mechanisms than upon the nature of the mechanism. Thus, clear cut neurotic mechanisms—even though they may border on the pathological—are not in and of themselves considered disqualifying. In this connection, there has been a shift in attitude toward psychopathology during the time the assessment program has been in operation. The only neurotic mechanism which is now considered clearly disqualifying is that of extreme rigidity. Experience has shown that the rigid individual who maintains ego integrity by adherence to fixed beliefs or routines without ability to be flexible in the face of group needs invariably becomes a source of disruption to the group during the wintering-over.

Group Structure. While work efficiency now might be considered the most important variable in Antarctic adjustment, the structure of the small isolated group has come to be considered a close second. Because of operational demands in the recruiting and training of personnel, little attention has been given to this factor in the assessment program. However it is now clear that the greatest future gains in the preventive psychiatry aspects of the assessment procedure will be found in evaluating the individual in terms of the group to which he will be assigned.

Summary

The Navy program for psychiatric assessment of personnel wintering over in the Antarctic has been described. During the 5-year history of the assessment program, there have been no documented cases of psychotic illness. Six men have been admitted to the sick list for psychiatric reasons, only one of whom had been through the assessment procedure. This case was diagnosed as a

personality disorder. Thus, it would appear that the program has been effective in identifying and eliminating individuals who will develop serious or incapacitating emotional illnesses under the stress of isolation.

An analysis of data relating to performance effectiveness in the Antarctic shows that there is a significant positive correlation between the initial psychiatric prediction and subsequent performance. However, because of several limitations in the data, the results in this aspect of the study should be interpreted with caution.

Certain shifts have occurred in the assessment criteria during the past 5 years. The most important variable in adjustment to Antarctic isolation now is considered to be vocational effectiveness. The structure and composition of the small isolated group is next in importance. Except for extreme rigidity, there are no neurotic mechanisms which are considered, per se, to be disqualifying. However, personality disorders do constitute a rather serious problem.

Discussion

Eugene Ziskind MD (Los Angeles, Calif.). —I have nothing but commendation for this paper of CAPT Nardini and his colleagues. The facts speak for themselves. The program has selected 1000 normal or superior, successfully screened individuals so that not a single major psychiatric casualty occurred during the stress of Antarctic isolation—an enviable record for even less stressful ways of living. No controls were possible. Perhaps a clue as to what such controls might have shown is to be gleaned from the fact that 5 of the 6 men who appeared on the sick list came from the small number who were not screened.

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- (2) Now CAPT Herrmann, Chief, Medical Service Corps, Bureau of Medicine and Surgery, Department of the Navy, Washington, D. C.
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* * * * *

Status of Freeze-Dried Skin Homograft in the Severely Burned Patient *

K. W. Sell MD (1), G. W. Hyatt MD (2), and R. B. Gresham MD (3)

Since 1951, the Tissue Bank of the Naval Medical School at Bethesda, Md., has maintained a clinical research and developmental program on the use of the stored skin homograft in the severely burned patient. This laboratory has provided over 300,000 cm² of stored skin which has been clinically utilized by 72 collaborating physicians in the treatment of 103 seriously burned patients with over 30% partial and full-thickness burns.

Data presented in this report summarize the observations of these collaborators; they permit evaluation of morbidity and mortality rates of burned patients who were treated with stored skin homografts. Included are 50 patients presented in a recent report by Young and Hyatt (9).

The probit analysis data of Bull and Fisher (1) has been chosen for statistical comparison with previous reports on burn mortality. These probit analysis tables attempt to predict expected mortality in percent, utilizing the age of the patient and total percentage of second and third-degree burn as variables. Accepting this method with the usual reservations of statistical analysis, the authors have compared mortality rates of patients treated with stored skin homografts and those treated with fresh skin homografts as reported by Jackson (5, 6). The possible antigenic capacity of skin homografts also is discussed.

Materials and Methods

The details of procurement and preservation of skin homografts have been recorded elsewhere (3, 4). Following is a brief outline of methods presently being used.

Split-thickness skin is obtained from cadavers under aseptic conditions, using an electric dermatome which has been set at 0.010 to 0.015 of an inch. This skin is stored in one of three ways: nutrient media, protective freezing with glycerol, or by freeze-drying. The freeze-drying method is emphasized because the majority of the writers' cases received grafts prepared by this method. The skin is divided into deposits of approximately 500 cm² by wrapping it with interposing layers of cellophane into a cylindrical form and placing it in a Pyrex test tube which is then frozen at -76 C in dry ice and alcohol slush for 15 minutes.

The deposits are stored in a freezer at -60 C until ready for the freeze-drying process. The skin is then freeze-dried for 72 hours, at the end of which time it has a residual moisture of 3 to 5%. upon removal from the freeze dryer, a secondary vacuum of at least 5000 microns is established, the bottles stoppered and sealed with a wax coating in preparation for storage at room temperature. Before use, the skin is rehydrated with saline or water for 30 minutes in order to restore its original pliability. It should be emphasized at this point that freeze-dried skin is nonviable and is considered to be primarily a biological dressing.

Results

Eighty-nine cases in this series lend themselves to evaluation, using the probit tables of Bull and Fisher. These tables suggest that 58 deaths could have been anticipated. The actual mortality was 37, indicating the possibility that 21 lives were saved by using the stored homograft. This would represent an over-all decrease of 36% from the expected mortality. On the basis of clinical experience of the collaborators and this supportive statistical evidence, it is apparent that the use of freeze-dried skin homografts offers a significant improvement in treatment of the severely burned patient. A more critical

evaluation must be made, however, to establish its therapeutic value as compared to the fresh homograft.

The most recent studies in a group of 53 patients recorded by Jackson (6) on the use of the fresh homograft indicate an expected mortality of 18.8 with an actual mortality of 11; this indicates the saving of 41% of lives as determined by the Bull and Fisher probit tables (Table 1).

Thus, using this method of comparison, little difference in percent mortality can be detected whether the patient is treated with fresh or stored skin homografts. These data, while highly suggestive, cannot be considered definitive because of many variables of the burn syndrome which are not considered. The clinical opinions of collaborators in this research, however, lend weight to this favorable comparison.

TABLE I
Comparison* of per cent saving of lives between fresh and stored homografts

	Total cases	Actual deaths	Expected deaths	% Saved
Jackson (1958)	53	11	18.8 *	41
Tissue Bank (1960)	89	37	58 *	36

*Bull and Fisher (2)

Of the collaborators, 13% (nine) stated that, in their opinion, the stored skin homografts were lifesaving; this was particularly evident in children. It was noted that when there was a take there was usually a decrease in pain, fever, and local infection. Early coverage of burn sites by homografts over joints permitted early motion because of less joint pain, thereby resulting in fewer contractures, in the opinion of some collaborators.

Review of collaborators' cases also reveals some interesting observations regarding the estimated percentage of take as well as the duration of stay of the various grafts. The freeze-dried graft exhibited approximately 80% modal take. The duration of stay of the graft averaged 19 days for the freeze-dried skin; this compares favorably with the 17-day stay reported for the fresh homograft (5, 6).

The authors' series offered suggestive evidence that patients who received early homografting procedures suffered less morbidity as measured by hospital stay than those who were grafted late. This occurred irrespective of percent of burn. Those grafted after 25 days tended to have hospital stays in excess of 150 days, while those grafted before 25 days generally had less than 150 hospital days (Figure 1).

Antigenicity

Pappas (7), working in the Tissue Bank Laboratory, noted no significant second set response to the application of freeze-dried skin in the mouse. Both first and second sets of such skin remained for an 11-day stay.

To be sure, in the clinical situation, it would be unlikely that repeated application of skin from a single donor would be made on a single patient, so

there is little possibility of a second set response. Even in the present state of ignorance, however, it seems safe to say that a homograft might possibly incite a systemic immune response to skin which may have effects more far reaching than are recognized. The potentiality of inciting antigen-antibody reactions analogous to the Rh system found in blood must be considered.

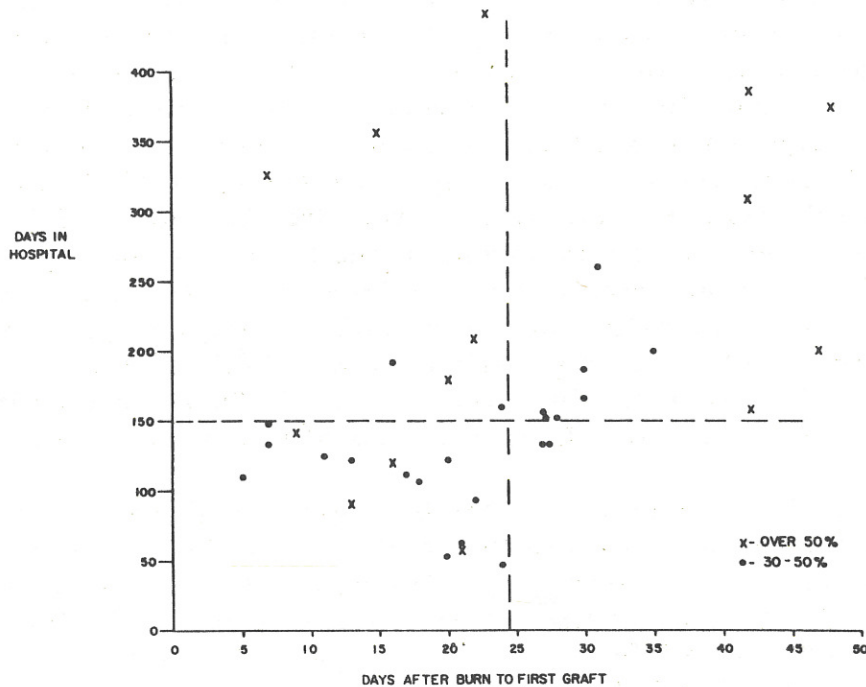


Fig. 1

Therefore, a homograft that would minimize the host response to the graft could be quite advantageous. The amount of data from human patients is not yet sufficient for statistically significant conclusions; however, in four cases where second applications of freeze-dried grafts from a single donor were applied, no second set response was recorded. In addition, the collaborators have noted no deleterious effects of the freeze-dried homograft on the subsequent take of autografts.

Discussion

The use of skin homografts is a well accepted adjunct to the usual therapeutic approach to the severely burned patient. Cadaveric skin was first used in 1881 by Girdner (2). In 1944, Webster (8) stored small autografts by three methods, one of which was the freeze-dried method. He observed an 80% take of the stored autograft. The clinical importance of this finding achieved more significance when, in 1950, the Tissue Bank of the Naval Medical School established a program for evaluating the freeze-drying process for tissue homografts in general. The evaluation of the freeze-dried homograft, as reported by collaborators, shows that it compares favorably with the fresh homograft when

mortality and duration of stay are considered. The additional value of freeze-dried skin homograft which can be stored at room temperature, can be shipped for long distances by regular mail, and stored in quantity for time of need, is obvious.

Comparison of mortality statistics by means of probit tables based on limited observations is not entirely satisfactory. If comparisons are to be made, however, recourse to such accepted methods offers the only approach at this time. The significance of mortality reduction with either fresh or stored skin homografts is apparent. It must be pointed out that these similar results occur despite two very important differences in the series. First, the Jackson series was carried out in one treatment center under one group of highly specialized physicians. The writers' group was made up of 72 physicians located throughout the United States and Europe who often had no special burn treatment facilities. Second, it was noted that the benefits of homografts in the present series occurred primarily in children under 10 years of age where a 48% reduction in the mortality was calculated as compared to a 33% reduction in the older group. (The Jackson series contained 86% children (5), as compared to only 38% children in the authors' group. This variance in age distribution would lend further significance to mortality statistics in the latter group of patients.)

It should be recognized that the homograft, both fresh and stored, has little to offer the patient with less than a 30% burn. Indeed, such surgical grafting procedures are unnecessary. Homograft skin, both fresh and stored, can be said to function as a satisfactory, though temporary, biological burn dressing, and often it is lifesaving in severe burns of over 30%.

The apparent lack of antigenic response observed in the freeze-dried homograft, when measured by the lack of second set response in the laboratory animal, implies theoretical advantages over the live fresh homograft. Control studies in laboratory animals and man will be necessary to delineate the role of the sensitization response to homografts in the production of future disease in the patient. Initial observations showing lack of antigenicity of freeze-dried skin, while provocative, will require more extensive investigation.

Definitive study to support the data presented in this article has yet to be accomplished. This would require an absolutely controlled double blind study in patients or higher animals with burns of exact magnitude. Only such a study would offer final answers to this comparison of the fresh and freeze-dried skin homograft.

Should further investigations and clinical use of the freeze-dried homograft continue to support the present findings, an expanded program to obtain large quantities of this material for use in anticipated large scale emergencies would be of considerable national interest.

Summary

On the basis of clinical observation of 103 severely burned patients, the freeze-dried homograft has been shown in this series to compare favorably with the fresh homograft in respect to mortality, morbidity, and duration of stay. The

freeze-dried product has the additional advantages of easy storage and shipping as well as apparent exemption from theoretical adverse sensitization effects on the patient. The need for better controlled investigative efforts in the evaluation of homografting products is emphasized.

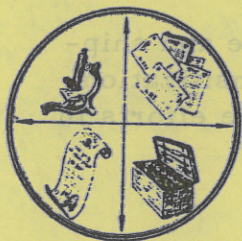
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- (1) LCDR K. W. Sell MC USN, formerly on staff of Tissue Bank Dept, U. S. Naval Medical School, NNMC, Bethesda, Md., now on duty in England.
- (2) G. W. Hyatt MD, currently Professor of Surgery (Orthopedics) Georgetown University School of Medicine, Washington, D. C., and formerly, as Captain in the Medical Corps of the U. S. Navy, Co-Founder and Director of the Tissue Bank Dept, U. S. Naval Medical School.
- (3) LCDR R. B. Gresham, currently Director of the Tissue Bank Dept, U. S. Naval Medical School.

*NOTE: Appreciation is extended to Mr. Francis C. Harwood, Manager of Publications, American Institute of Biological Sciences, 2000 P St., N. W., Washington, D. C., and to the authors for permission to republish this article in the U. S. Navy Medical News Letter. The original article appears in the publication, "Research in Burns," edited by Curtis P. Artz, M. D., and copublished by the American Institute of Biological Sciences and the F. A. Davis Co., Philadelphia, Penna. This paper is one of many contributions to The Proceedings of The First International Congress on Research in Burns, held at the National Naval Medical Center, Bethesda, Md., September 19 - 22, 1960.—Editor

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MISCELLANY

General Practice Residency - U. S. Naval Hospital Jacksonville, Florida

The Bureau of Medicine and Surgery is in the process of establishing a 2-year residency training program in General Practice at the U. S. Naval Hospital, Jacksonville, Fla. It is anticipated that the program will be operative during the early summer of 1963.

Interested applicants are encouraged to apply prior to the 15 November 1962 deadline for submission of applications for all inservice training programs to begin in FY 1964. Applications should be submitted in accordance with BUMEDINST 1520.10B: however, in view of the short time remaining prior to deadline, application may be made by dispatch, followed by official letter request. Consideration in this specialty only may be deferred until 1 December to accommodate as many requests as possible.

As the program will be creditable toward membership in the American Academy of General Practice, the obligated service required will be year for year as prescribed for inservice residency training, and selections will be contingent on acceptance of Regular Navy commission.

—Training Branch, Professional Div., BuMed

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CDR Butler Heads NC Anesthesia Program

CDR Anna T. Butler NC USN has been appointed as Head of the Nurse Corps Anesthesia Program, U.S. Naval Medical School, NNMCMC, Bethesda, Md.

CDR Butler is a Certified Registered Nurse Anesthetist, and holds Baccalaureate and Master's degrees in nursing education from the University of California. She has served as a nurse anesthetist in the Navy for the past 18 years. Her assignments have included duty aboard hospital ships and at naval medical activities in the continental United States, Cuba, and Alaska.

In serving as head of this program, CDR Butler has the responsibility for implementing the first Navy anesthesia program for Nurse Corps officers. This is also the first program for training nurse anesthetists which carries accredited university courses. These courses are provided in cooperation with George Washington University.

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From the Note BookAerospace Medical Research Attracts
Visitors to Pensacola *

The Slow Rotation Room (SRR) and Human Disorientation Device (HDD) continue to attract visitors to the Naval School of Aviation Medicine at the Naval Aviation Medical Center, Pensacola, Fla. The SRR has been built on the human centrifuge, and the HDD resembles a huge cement mixer. The devices are used in exposing individuals either to rotary or linear accelerations for experiments concerned with stimulation of organs of equilibrium in the inner ear in connection with motion and space sickness studies.

Visitors go to Pensacola from all parts of the United States and from many foreign lands. During the month of October 1962, military representatives from the following foreign countries were given tours, briefing sessions, and/or lectures on the research and operational aspects of NAVAVMEDCEN programs: Switzerland, Belgium, France, Norway, Italy, Federal Republic of Germany, Iran, Pakistan, Republic of the Philippines, Indonesia, Republic of China (Taiwan), Haiti, Dominican Republic, Venezuela, and Brazil.

A class of foreign supply officers will see the medical facilities while attending a course at the Naval Air Station, Pensacola. Approximately thirty Reserve Medical officers from Kansas City will spend 3 days at the Naval Aviation Medical Center, 30 October - 2 November 1962.

Research is one phase of the work at the SCHAVMED. The School has just received its one hundred and second class of student flight surgeons and is about to graduate its ninety-seventh class of aviation medicine technicians.

* Based upon information received from CDR Calvin F. Johnson MSC USN, Administrative Officer, SCHAVMED, NAVAVMEDCEN, Pensacola, Fla.

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Overseas Christmas Mail and Cutoff Dates

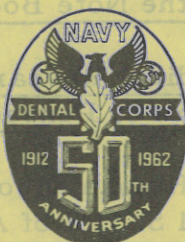
The Secretary of Defense and the Postmaster General have announced that Christmas parcels for members of the Armed Forces overseas should be mailed before 20 November 1962 or Christmas delivery cannot be guaranteed.

Articles should be tightly packed in double-faced corrugated cardboard, wood, metal, or fiberboard boxes, wrapped in heavy paper, and well tied. It is advisable to include an extra set of addresses inside the parcel.

Packages going to an APO or FPO must not weigh over 50 lbs each if going to England or Scotland, or more than 70 lbs to other points. None may be over 100 inches in length and girth combined.

Local post offices will furnish instructions about packing, size, weight, and prohibited articles (perishable items, matches, lighter fluid, and others). Keep deadlines in mind—Air Mail may be sent as late as 10 December, but ordinary mail must be sent on or before 20 November. —Help insure a Merry Christmas for loved ones serving overseas by mailing early.

DENTAL



SECTION

Dental Caries in the Light of Electron Microscopy

J. -G. Helmcke, Dr. Phil. Habil.* International Dental Journal 12(3):322-334, September 1962.

The precise nature and mechanism of dental caries are still unknown. The elucidation of these problems, expected from electron microscopy, has not yet been attained. In spite of some 30 publications, contradictory opinions are still expressed which, in their basic ideas, are influenced by former hypotheses on the structure and composition of the enamel and dentine.

Caries research using the electron microscope is complicated, because of the technical difficulties of the preparation of suitable specimens in which electron microscopy can reproduce the transition from sound to disintegrated dental tissues, since artifacts are easily produced which are often believed to be real structures and influence the establishment of hypotheses.

Three opinions exist on caries of enamel:

1. Caries begin with demineralization of the prisms. By this process the organic substances are freed and later destroyed by bacterial activity.
2. The organic substances are the first to be acted upon by caries, so that the mineral ingredients lose their mutual support and breakdown.
3. The third hypothesis presupposes a regular distribution of the organic and inorganic substances in the enamel, and considers that the advancing caries attack the organic and inorganic substances almost uniformly and contemporaneously.

There is agreement on caries of dentine, that the process advances within the tubules and from there dissolves the basic substance, by which apparently the demineralization ensues.

In advance of progressive caries, a recrystallization from hydroxyapatite into whitlockite may take place. Later, with bacterial invasion these crystals disappear.

* Professor an der Technischen Universität Berlin, Lehrgebiet Biologie und Anthropologie, und Leiter der Forschungsgruppe für Mikromorphologie, Berlin-Dahlem, Deutschland

The Inheritance of Resistance and
Susceptibility to Dental Caries

H. R. Hunt, BS, AM, PhD* and H. O. Goodman, BA, AM, PhD**, International Dental Journal 12(3):306-321, September 1962.

The production of caries-susceptible and caries-resistant lines of rats has clearly indicated that genetic factors play a significant role in causing dental caries. The genes of an organism establish its general form and functions, but environmental factors participate in moulding its traits.

An adequate concept of the causation of dental caries requires an experimental determination of the various means by which hereditary and environmental factors affect caries. The immediate cause of caries is always acidogenic microorganisms, which manufacture organic acids from fermentable carbohydrates. The genes modify the oral environment favorably or unfavorably for these organisms. Desalivation proves that the saliva of resistant rats is an anti-caries factor, but there is another, extra-salivary factor, presumably in the teeth. The endocrine glands (gonads, thyroid, pituitary) affect caries, apparently through saliva.

Horowitz, Goodman, and their collaborators (1958, 1959) detected significant effects on caries in human twins. Book and Grahnen (1953) studied caries in Swedish conscripts and concluded that resistance is influenced by heredity. Genetic factors in man affect cusp pattern, crown morphology, root shape, and dental development. Metabolic disorders, also, are known to affect human dental caries. Thus caries in man is a polygenic trait.

There is no single cause of dental caries. It is the result of a number of factors acting simultaneously. None of these factors can be studied with confidence unless the others are known and controlled. The effects of the genes are probably along several paths of causation, but no one of these paths has yet been identified with certainty.

* Professor Emeritus of Zoology, Previously head of the Department of Zoology, Michigan State University, East Lansing, Michigan, U. S. A.

** Assistant Professor of Genetics, Bowman Gray School of Medicine, Winston-Salem, North Carolina, U. S. A.

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A Decade's Progress in the Understanding
of the Etiology of Dental Caries

J. H. Shaw, BA, MS, PhD*, International Dental Journal 12(3):291-305, September 1962.

The etiology of Dental caries has become more clearly understood in the past decade as a result of the intense investigation on various facets. A source of

readily fermentable carbohydrates is required in the oral cavity as a source of energy for the microorganisms required for the production of carious lesions. Apparently various microorganisms, which produce substantial amounts of acid in the course of their normal metabolism and possess the ability to live in the ecological circumstances of the oral cavity, are capable of producing carious lesions. Certain streptococci are particularly suspected while the lactobacilli seem less likely to be implicated than was believed previously. The caries-producing microorganisms are readily transmissible from a caries-active oral cavity.

Saliva is an important component of the oral milieu. Its composition is under the control of systemic influences. Both the quantity and quality of saliva appear to have profound relationships to the incidence of dental caries.

Inherent differences in the caries-susceptibility of experimental animals are apparent over a broad spectrum from high caries-resistance to high caries-susceptibility. These inherent differences may occur as the result of specific influences brought to bear during tooth development, such as occurs with various levels of fluoride ingestion; or, the inherent differences may be dependent upon genetic constitution as demonstrated after generations of in-breeding and progeny testing in laboratory animals.

* Associate Professor of Biological Chemistry, Harvard School of Dental Medicine, Boston, Mass., U. S. A.

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Prevention of Dental X-Ray Hazards in the United States Navy

The Dental Division of the Bureau of Medicine and Surgery, in cooperation with the Division of Radiological Health of the U. S. Public Health Service, recently completed a survey of all dental x-ray machines in use throughout the Navy. The survey was designed to check the total filtration (inherent and added), the symmetry and diameter of the useful x-ray beam and leakage from the portal end of the tube head.

Filtration readings ranged from 0.6 mm of aluminum to 3 plus. Beam diameter readings ranged from 1.2 inches to 7.5 inches. The criteria used to determine the need for corrective procedures to an x-ray unit were as follows:

Filtration -- (a) Up to 70 KVP - 2 mm Aluminum

(b) Above 70 KVP - 2.5 mm Aluminum

Beam Diameter -- Maximum 3.0 inches

Of the 485 machines surveyed, 277 met the criteria established for filtration and 325 had a beam diameter of 3.0 inches or less.

Each activity was informed of the findings of the machine(s) in use and in all cases where the filtration and/or beam diameter did not meet the above criteria they were furnished the necessary aluminum discs and lead collimators to effect corrective action.

This survey was conducted in consonance with the efforts of the Naval Dental Corps to insure maximum protection to both patient and operator from ionizing radiation. Other procedures include the use of high speed film, electronic timers, protective screens and lead impregnated plastic and rubber aprons. — (Planning and Logistics Br., Dental Div., BuMed)

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Personnel and Professional Notes

Manual of the Medical Department - Advance Change 13-2.

16-14. Release to Inactive Duty (Disposition of Health Record upon)

(1) The Health Record shall be closed: (a) whenever members of the Reserve components are released from active duty, including active duty for training in excess of 30 days, (b) upon transfer to Naval or Marine Corps Reserve and release to inactive duty of Regular Navy and Marine Corps personnel, and (c) upon transfer to the Fleet Reserve or Fleet Marine Corps Reserve and release to inactive duty.

(2) All Forms NAVMED 10; SF 88 and 600 (and other forms containing a chronological record of medical care--sec. XVI); and SF 602 and DD 1141 (when included as a component part of the record) shall be appended to the original SF 88 completed at the time of release to inactive duty, and forwarded to BUMED.

(3) The remainder of the Health Record (including the DD 722 and 722-1; SF 89, 601, and 603; and NAVMED 1346 and 1406) shall be delivered to the commanding officer for transmittal concurrently with the service record....

Dr. Little Lectures at USN Dental School. Dr. Kitty Little of the Nuffield Orthopedic Center, Department of Orthopedic Surgery, Oxford University, London, England, lectured on the "Place of Dental Caries Among the Degenerative Diseases" to staff, resident, and postgraduate dental officers, and civilian and military guests, at the U. S. Naval Dental School, Bethesda, Md., on Thursday, 6 September.

Dr. Little is enroute to the University of California, Los Angeles, California, where she will be a special invitational research fellow in the Department of Surgery. She has done outstanding original work in the field of osteoporosis and is an acknowledged leader in the field of x-ray defraction and electron microscopy studies of the organic matrix of bone tissues.

She was trained in metallurgy and x-ray defraction, but has applied her techniques to biological problems, particularly to the structure and growth of bones and teeth.

Royal Canadian Dental Corps Presents Plaque to USN Dental School. Captain A. R. Frechette, DC, USN, Commanding Officer of the U. S. Naval Dental School, on 24 September 1962 accepted from Lieutenant Colonel John W. Turner, RCDC, a plaque which was presented to the U. S. Naval Dental School on behalf

of Brigadier K. M. Baird, Director General of Dental Services for the Canadian Forces, and the Officers of the Royal Canadian Dental Corps.

Lieutenant Colonel Turner is serving as Head of the Academic Division of the Naval Dental School in a 2 year exchange program between the U. S. Naval Dental Corps and the Royal Canadian Dental Corps.

Captains, DC, USN - Retired 1 September 1962.

Eastes W. Murphy - after 24 years service - Administrative Command, San Diego, Calif.

Walter W. Dann - after 21 years service - Executive Officer, Naval Dental Clinic, Pearl Harbor, Hawaii

Charles T. Pridgeon - after 25 years service - Marine Corps Base, Camp Lejeune, North Carolina

Dental Division Panel Discussion at Naval Dental School. A group of representatives from the Dental Division, Bureau of Medicine and Surgery, held a panel discussion at the U. S. Naval Dental School, National Naval Medical Center, Bethesda, Md., on Friday, 28 September 1962. The audience consisted of staff, resident and postgraduate dental officers, and civilian and military guests.

The moderator for the panel was Capt Robert S. Snyder DC USN, Assistant Chief of the Dental Division. Other Dental Division members on the panel were: Capt Edward C. Raffetto, DC, USN, Head of the Personnel Branch; Capt William R. Stanmeyer, DC, USN, Head of the Professional and Research Branches; Capt George O. Stead, DC, USN, Head, Planning and Logistics Branch; and Capt Harry J. Wunderlich, DC, USNR, Head of the Naval Dental Reserve Branch.

This was an audience participation program and those attending were urged to submit to the panelists any questions they might have concerning the functions of the various departments of the Dental Division, Bureau of Medicine and Surgery.

USS Boxer Hosts University of Santo Domingo Dental Group. The Dental Department of the USS Boxer recently hosted the Dean, faculty and students of the Instituto de Odontologia, University of Santo Domingo. Table clinics and demonstrations were presented by Lt G. L. Scott, DC, USN; Lt J. C. Yarbrough, DC, USNR; and Lt J. L. Nellis, DC, USNR. Laboratory procedures and techniques were demonstrated by J. A. Hoelzer, DT1, USN. A lecture was given to the Dominican group by LCdr W. R. Hiatt, DC, USN, Senior Dental Officer aboard the Boxer. The following day the Dental Officers of the Boxer toured the Instituto de Odontologia, and the Instituto de Oncologia of the University of Santo Domingo.

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PREVENTIVE MEDICINE

The Danger of Drinking Sea Water

WHO Chronicle 16(9): 343-345, September 1962.

The water requirements of a man at sea vary between 1000 and 1500 ml daily ; if there is no shade and it is very hot, they may be much higher. Recently the drinking of sea water has been advocated for castaways who have no fresh water, but a group of experts convened by WHO stresses the dangers of sea water and states categorically that it should never be drunk.

The salt content of the body fluids is about 1%. In the open ocean, on the other hand, the salt content of the sea is about 3-1/2%. In health, when food and water consumption is adequate, the salt concentration in the body is kept relatively constant by the kidney; it varies, but only within a small range. In the healthy individual suffering from deprivation of water the concentration of salt in the urine does not average more than 2%. This difference in salt content between the body fluids and sea water and the physiological inability of the kidney to excrete more than a certain proportion of salt in the urine form the basis of the generally accepted view that drinking sea water does harm. It introduces a hypertonic solution into the circulation, water is withdrawn from the tissues to restore the osmotic balance between tissues and vascular system, the blood volume is increased, and the kidney is called upon to excrete the excess fluid. The net result is progressive dehydration of the tissues, leading to disturbances in the acid-base balance, a rise in the nonprotein nitrogen of the blood and the plasma protein concentration, a reduced cardiac output, thirst, and in due course exhaustion, collapse, and death.

This view was challenged by Dr. Alain Bombard, who crossed the Atlantic Ocean in 1952 on an inflatable raft, taking over 2 months for the voyage and relying chiefly on sea water and fluids expressed from fish to quench his thirst. Bombard wrote a book about this voyage that met with considerable success, and his advocacy of sea water for drinking by castaways when fresh water is not available received much publicity—a good deal more than that received by any attempt to refute his views. The opinion he reached after these trials on himself was that people should begin drinking sea water as soon as possible before dehydration starts, but in small quantities only, so as to avoid nausea and diarrhea. The fresh water that is available should be

carefully conserved, and if there is none, fluids should be expressed from fish by squeezing them in plastic bags or towels.

Bombard's experiments were followed with great interest by Dr. G. Aury, principal medical officer of the French Navy, and in 1953 and 1954 he also carried out experiments on volunteers subjected to shipwreck conditions, he himself taking part. Aury described the experiments as being very successful; the sea water was readily drunk by the volunteers, they suffered from no serious complaints, and when the experiments were over they were able to resume their duties immediately. It may be noted, however, that the experiments lasted for only 2-4 days.

Impressed by Bombard's findings, a German physician, Dr. Lindemann, made no less than 3 voyages across the Atlantic ocean, in a canoe and then in a collapsible boat. Lindemann also wrote a book on his voyages, which for one reason or another failed to achieve the publicity that had attended Bombard's. Lindemann reached diametrically opposite conclusions to those of Bombard and Aury. Sea water, he held, should never be drunk; fluid could only be expressed from fish by means of a press; and no fish should be eaten if no fresh water is available.

In 1959, the question of drinking sea water came before the Maritime Safety Committee of the Inter-Governmental Maritime Consultative Organization (IMCO). The experiments of Bombard and Aury and the wide publicity they had received had created much confusion about the drinking of sea water, and the impression had spread among seafarers that the dangers of drinking sea water had been grossly exaggerated. The Maritime Safety Committee felt that an authoritative opinion was required on what had become a controversial question, and asked WHO for its views. Pending a definitive opinion to the contrary, however, the Committee urged that no governments should advocate the drinking of sea water by shipwrecked mariners.

WHO convened a meeting of 5 internationally recognized experts at Geneva to discuss the question. These were: Surgeon Capt F. W. Baskerville, United Kingdom; Dr. J. Bare, Switzerland; Dr. H. Laborit, France; Professor R. A. McCance, United Kingdom; and Professor A. V. Wolf, USA. Their views—which, it may be noted, do not represent the decisions or stated policy of WHO—were based on an analysis of all the available evidence.

The experts considered the effects of drinking sea water under three heads: effects on the bowel, on the body as a whole, and on the mind. Because of the well-known cathartic effect of salts, drinking sea water is likely to lead to intestinal discomfort, if not to frank diarrhea. This effect varies in different individuals, and is more likely to follow if large amounts are ingested. On the body as a whole, the effect of sea water is to overload the circulation with salt, which can only be excreted by drawing upon the body water and so dehydrating the body even more. Finally, the evidence shows that even small amounts of sea water affect some individuals unfavorably, while large amounts have been shown to lead to mental disturbances and even suicidal impulses.

The experts examined the contention that a limited supply of fresh water could be made to last longer if it were mixed with sea water. This has been

shown to be feasible experimentally in certain animals and is theoretically possible in man. But (the group emphasized) no acceptable evidence has ever been adduced that in man sea water can be used satisfactorily to eke out supplies of fresh water. This as yet unproved hypothesis cannot, therefore, be made the basis of a practical recommendation for saving the life of people shipwrecked at sea.

One of the reasons for advocating the drinking of sea water is to preserve morale, which in the circumstances of shipwreck is likely to be low. The experts held the view that morale can be upheld if it is made clear to the castaways that death from lack of water alone is hardly possible for several days. It has been shown from experimental work that a man can remain reasonably fit without water for 6 days, and men have survived without it for twice that period at sea. It has also been shown that 500 ml (one pint) of fresh water daily, if possible supplemented by 100 g (3-1/2 ounces) of carbohydrate, will maintain a man almost without deterioration for at least 6 days.

"After any disaster," the group remarked, "many survivors are mentally stunned and incapable of thinking for themselves. It is therefore important that as many of the ship's company as possible be qualified to take charge, preferably those with a natural ability for leadership. Discipline must be maintained, proper lookouts kept and rations evenly and regularly issued. Everything must be done to obtain the best protection against cold or heat, to secure adequate ventilation in a covered raft and thus avoid carbon dioxide poisoning, and, finally, to conserve as much energy as possible. A simple routine will do much to convince the untrained survivor that the situation is in hand and that 'everything is going to be all right'."

The group ended its report with the following advice to those who have to abandon ship:

(1) Unless you are in charge of a party, do as you are told. Try to remain cheerful. Discipline and morale count for more than anything else.

(2) If you have a remedy for sea-sickness, take it, if needed.

(3) If the atmospheric temperature is low, your immediate and most dangerous enemy will be cold, so put on as many woolen clothes as you can. They will help keep you warm in the water or on a covered raft, and even if you are fully clothed your life-jacket will always keep you afloat.

(4) If the temperature is high, avoid sunburn, keep yourself as much as possible in the shade, and keep your clothes moist to reduce sweating and so conserve body water.

(5) Drink no water for the first 24 hours you are adrift. Then take 500 ml (a pint) of fresh water daily until supplies run low, thereafter 100 ml until the water is finished.

(6) Never drink sea water. Never mix sea with fresh water if fresh water is in short supply. Sea water has been used to moisten the mouth, but the temptation to swallow it may be irresistible and it is better not to use it for this purpose. Never drink urine.

—PrevMedDiv, BuMed.

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Location of Milk in Store Changes Taste

Science News Letter 81:393, June 23, 1962.

The taste of milk bought in grocery stores can depend on where the carton is located on the display shelf, three University of California food scientists have found.

Light from white fluorescent lamps, the kind commonly used in grocery display cases, can change the taste of milk even in cardboard cartons. However, the unpleasant flavor develops only in the outside cartons close to the lamp.

"Some types of cartons and some lamps are worse than others," Walter Dunkley told the Institute of Food Technologists meeting in Miami Beach, Florida. He reported that the effects are hard to pin down and the flavor change can be confused with others.

Temperature, length of exposure, freshness of the milk, the cow's diet and many other factors also can affect development of light flavor, which occurs under commercial conditions often enough to create an occasional milk quality problem.

The flavor changes created by fluorescent lamps are similar to those caused by sunlight, which have been known for years. Nutrient value of the milk is also reduced by prolonged exposure to high-intensity fluorescent light.

J. D. Franklin and R. M. Pangborn, also of the University of California, cooperated with Mr. Dunkley in the milk-flavor studies.

* * * * *

Use of BCG Vaccine

Public Health Reports, Statement by Tuberculosis Control Advisory Committee to the Public Health Service, 77(8):680, August 1962.

In March 1962, the Tuberculosis Control Advisory Committee to the Surgeon General of the Public Health Service prepared the following statement, in the hope that it will help administrators of tuberculosis control programs in making decisions about the use of BCG:

The Tuberculosis Control Advisory Committee believes that the use of BCG vaccine should be determined on the basis of the need for it in given individuals or particular population groups. Under circumstances in which exposure to tuberculous infection cannot be avoided, risk of disease is high, and periodic examination and supervision of those exposed is a practical impossibility, the committee recommends the use of BCG.

Ideally, all persons with communicable tuberculosis are under treatment either in a hospital or at home under circumstances that protect others from their disease, and their contacts are examined at suitable intervals. Unfortunately, there are instances in which the patient is not isolated and his

contacts are not examined regularly. In such cases, BCG vaccination is recommended.

Examples of persons who should be considered for vaccination are tuberculin-negative contacts of a tuberculosis patient in a group of migrant workers, or in a highly mobile population group as in some crowded urban areas, and tuberculin-negative contacts who cannot be protected by other control measures. However, health authorities who use BCG in these situations have the responsibility for continued medical supervision of the patient with tuberculosis and for continued efforts to examine contacts at appropriate intervals, whether or not they have received BCG. The committee wishes to emphasize that BCG vaccination should not be considered a substitute for other control measures, but should be an addition to these, used in special situations.

Finally, in this country, for most of the population BCG is not needed. Indeed, it is the opinion of the committee that widespread BCG vaccination in the United States today is contraindicated because it interferes with the use of the tuberculin test as an epidemiologic and diagnostic tool.

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Triatoma protracta (Uhler) -
as Public Health Problem, California

John D. Walsh, Bureau of Vector Control, California State Department of Public Health, and John Paul Jones, Jr., Medical Student, University of California; Medical Student Assistant, Bureau of Vector Control (Summers of 1960-1962). Public Health Significance of the Cone-Nosed Bug, Triatoma protracta (Uhler), in the Sierra Nevada Foothills of California, California Vector Views 9(7):33-36, July 1962.

The medical and social importance of reactions to the bites of the Triatominae is becoming generally recognized and is probably greater than presently assumed. In an attempt to evaluate the extent and seriousness of this problem, a study was initiated to collect case histories of persons exhibiting sensitivity to the bite of Triatoma protracta. A questionnaire was submitted to these individuals. The study was carried out during 1961 in the Sierra Nevada foothills along the east side of the San Joaquin Valley. Although case histories were received from all of the foothill counties from Tulare to Calaveras, the majority was confined to Mariposa and Tuolumne counties. One hundred and ten case histories of Triatoma bites were collected (71 females and 39 males). In every case the subject had been bitten on more than one occasion. Over 95% had collected the bug for identification. All were T. protracta. Persons interviewed were shown a specimen which they confirmed as the type that bit them.

The questionnaire used to compile the information was designed to differentiate between 2 types of sensitivity manifestations. The first is a localized cutaneous reaction at the bite site, the second a systemic response. One

hundred of the persons queried (91%) experienced a localized dermal reaction at the site of their last bite. Of this number, 38 persons reacted in less than one minute, 27 within half an hour, and 35 more slowly. Over half (64%) reported that these localized bite reactions disappeared within 48 hours, with or without medication. In the remainder of the cases, the symptoms lasted more than 2 days.

Response to the bite varies greatly and is generally attributed to foreign proteins in the saliva of the bug. Severity of the reaction depends upon sensitivity of the host, and probably on the amount of antigen introduced by the bug during engorgement. The saliva, when introduced into the human body, probably induces the formation of cellular antibodies in sensitive individuals. When this antigen-antibody reaction occurs in the tissues or on histamine-laden cells, there is either a localized or generalized liberation of histamine, which apparently results in the bite reaction. Hypersensitivity to Triatoma bites can be acquired by repeated salivary injections in as short a time as 5 months; however, it usually takes several years before severe symptoms appear, depending on exposure and sensitivity of the individual. It appears significant that 92% of the cases in the present study had lived in the area over 5 years and only 1 patient had lived there for less than 3 years.

Ninety-two (84%) of the respondents experienced some type of systemic reaction. This does not imply that 84% of all persons are hypersensitive to Triatoma bites, since the questionnaires were sent to severe reactors who were especially cooperative in replying. Thorough investigations of localities where Triatoma actively invade human dwellings and feed on people, revealed that most people experienced no unusual reaction to the bite of the insect. It was thought by resident physicians interviewed that most of the people in the area had been bitten, but that less than 5% experienced severe systemic reactions.

The most common symptom was pruritus, which was experienced by 86% (79/92). This severe itching was generalized over the body, but was usually most severe on the scalp, palms, and soles. It lasted from 30 minutes to 5 hours, depending upon the severity of the individual's reaction.

The next most common symptom, experienced by 72% (66/92), was edema; this occurred generally throughout the body but especially around the eyes, tongue, larynx, and trachea. In 51% (47/92), this edematous swelling made speaking, breathing, and swallowing difficult. Swelling began to recede, even without medication, within 10 to 12 hours after the bite. Over half (55/92), experienced welts and rashes which lasted for several hours, or until medication was administered. Often the rash began on the extremities and proceeded toward the trunk. Welts usually took the form of large, urticarial, erythematous wheals, appearing within a few minutes after the bite and lasting usually less than an hour.

Nausea following the bites was reported in 42% (39/92) of the cases; a history of fainting was revealed in 38% (35/92). The fainting spells were of short duration and occurred invariably as the patients arose from bed.

Other symptoms reported are listed in order of descending frequency:

pain (29%), vomiting (25%), fever (24%), cramps (20%), and diarrhea (17%). Infrequent symptoms were: dizziness without fainting, palpitation, temporary loss of memory, and diffuse malaise with whole-body aches and weakness.

Forty-one percent (38/92) immediately sought medical attention after the last bite; 29% (11/38) of these were hospitalized.

In this survey the bites occurred from April through November, in 1960 and 1961. Most of the bites were reported to occur from June through September. Eighty-three percent had a history of bites prior to 1960; many periodically since 1930.

Only 3 persons reported being bitten between 6 a. m. and 12 noon. The majority (74%) of bites occurred in the early morning hours from midnight to 6 a. m. Relatively few patients (32%) were bitten in the early evening hours of 6 p. m. to 12 midnight, and only 8% were bitten in the afternoon. In almost all cases, the bite of the bug was not felt, so the exact time of feeding was unknown.

All but one of the 110 persons were bitten within the home. Most persons found the engorged bugs in their beds. In addition, they were often found in bedroom closets, especially in pockets of clothing and in shoes; under rugs; behind drapes and pictures; crawling around crevices and baseboards; and occasionally were seen on walls or crawling on the ceiling. In homes subjected to periodic annoyance, the bugs were largely limited to the bedroom, living room, and outside porch. In residences with heavy infestations they are apt to be found anywhere within the home. They frequently enter houses through openings resulting from shifts in the foundation. Other means of entry reported on the questionnaire were gaps around doors, windows, or the undersurface of the house, or on clothing or bedding which had been hanging outside and then carried into the house.

The bites were generally distributed over the body in only 15% of the cases, with most of the bites occurring on the extremities rather than on the trunk. In 12% of the cases the bites were on the thorax, 18% on the abdomen. Eighty percent of the patients were bitten on their arms or hands, and 40% stated they had generally been bitten on the head or neck. Sixty percent of the individuals were bitten on their legs or feet. Since the vast majority were bitten at night while in bed, one would anticipate bites on the head and upper extremities on the basis of accessibility.

Individuals were asked whether they had noticed any difference in the severity of reaction following each successive bite. One-third stated that they had noted no difference; of the two-thirds who had noted a difference, 37% stated that the bites were less severe each time. Several suggested this interpretation might be biased due to the promptness with which they had sought medication following initial experiences. The remaining 63% that noted a difference remarked they thought that reactions were increasingly severe.

Though man is occasionally bitten by T. protracta, the primary hosts are small mammals. Wood rats (neotoma) are generally considered to be the most common hosts; and their nests are probably an important source of these bugs. It is essential that more be known about the host-parasite relationship

of T. protracta before selective control recommendations can be formulated. It is already evident, however, that any control measures should include a consideration of their natural hosts.

* * * * *

Vending Machine Salmonellosis - Colorado

Epidemiological Reports, Morbidity and Mortality Weekly Report, U. S. Department of Health, Education, and Welfare, Public Health Service, Prepared by the Communicable Disease Center, Atlanta 22, Georgia, Vol. II(26):2, July 6, 1962.

Between April 20 and 27, 6 adults in Denver, Colorado, experienced a gastrointestinal illness severe enough in 4 cases to warrant hospitalization. The illness was characterized by fever, nausea, vomiting, abdominal cramps, and diarrhea. All 6 cases were found to have consumed chocolate eclairs obtained from refrigerated, automatic vending machines. Salmonella typhimurium was cultured from stool samples of all cases. Characteristics of the cases are shown below. Cases 4 and 5 with short incubation periods had both undergone partial gastrectomies in the past.

Case	Age	Sex	Onset of Symptoms	Incubation Period
1	43	F	4/21	16 hours
2	33	M	4/25	12 hours
3	42	M	4/25	15 hours
4	45	M	4/27	7 3/4 hours
5	53	M	4/27	4 1/2 hours
6	40	M	4/27	9 hours

The food histories of all were identical with regard to consumption of eclairs, but varied widely in all other respects. The eclairs consumed were obtained from three different vending machines supplied by a single bakery. Under questionable conditions of sanitation and in quarters with evidence of rodents and cockroaches, the bakery produced an average of 80 dozen eclairs each day. Each of the bakeries' employees who handled food in any of its stages of preparation was found to be free from salmonella by stool culture.

Eclairs were prepared by using a commercial cream filler and commercial icing. The pastry shell included frozen eggs in its ingredients. These eclairs were prepared, and individually wrapped, by 9:00 a. m. each morning and then were left at room temperature on trays until collected by representatives of the companies purchasing them. In no instance were the eclairs at the incriminated vending machines delivered to machines until the following morning, approximately 24 hours after the baking.

The S. typhimurium phage type from 2 of the patients and from environmental samples of the bakery were the same, Type C.

* * * * *

Filariasis in Burma

WHO Chronicle 16(7):269-270, July 1962.

Filariasis was known to exist in Burma long before the Second World War. But it was not considered to be a serious problem, and it was the general belief that elephantiasis was rare and occurred only as a long-standing disability in a few Indians. In 1957, however, a survey of 1892 patients admitted into Rangoon General Hospital for all types of complaints revealed that 144 had microfilariae of Wuchereria bancrofti in the peripheral blood at night. Likewise, 5 medical officers, 30 nurses, and 16% of the hospital laborers (most of whom were Indian) were found to be infected; and 15% of the Culex fatigans mosquitoes caught were infected.

The first campaign to combat filariasis was begun in 1958 and gradually it has been intensified. In 1961, a World Health Organization consultant visited Rangoon and other towns in Burma. In Rangoon, he found 5,953 (5.7%) out of 104,444 blood films examined between December 1959 and May 1961 positive for microfilariae. The prevalence among males was higher than in females. Among Indians, the incidence was higher than noted in Burmese or Chinese. Probably some of the Indian immigrants had been infected elsewhere. Elephantiasis noticed in the past in Rangoon was of long duration and confined to Indians rather than other groups. In the new operable filariasis clinics, 75 people with the disease presented themselves within the first 3 weeks; all cases but one (Burmese as well as Indians) had developed in the previous year or two. The consultant concluded, therefore, that intense transmission of Bancroftian filariasis was a recent event in Rangoon. The incidence of these infections rises gradually through childhood and puberty to 6.7% in the 15-19 age group, and remains thereafter at about 7%.

The reason for the increased transmission of filariasis is the deterioration of the drainage system, allowing for excellent breeding places for Culex fatigans.

The attack on filariasis in Rangoon is three-pronged. The drainage system is being renovated: new pumps are being installed, the drains are being overhauled and cleaned, and the water supply is being augmented to eliminate storage tanks. Culex fatigans is being attacked with insecticides. People suffering from filariasis are treated with diethylcarbamazine, and a follow-up system has been instituted. The World Health Organization pointed out, however, that spraying houses with insecticides was of little value because of the habit of Culex fatigans to rest on objects such as curtains and clothes... and in dark, inaccessible places rather than on the walls. The best course is to clear the breeding places, attacking the larvae with insecticides such as Baytex, diazinon, and malathion, to which they are susceptible. At the present

rate of survey for filariasis, it will take 10 years to cover the whole population of Rangoon; consequently, the present organization needs to be expanded. The consultant suggested trials with Mel W, to obviate some of the difficulties found in Burma (as in Ceylon) in the use of diethylcarbamazine. The scheme for the improvement of the drainage system will in itself do much to reduce the population of *Culex fatigans*. It is important that entomologists investigate its behaviour to obtain necessary information about the residual population, the size of which it is impossible to forecast.

* * * * *



Did you know:

That in 1919, 13 persons died of pneumonic plague in Oakland, Calif., 12 of them because of a physician's ignorance of the disease? The physician, a victim himself, made the mistake of incising the bubo of a plague patient. Before the disease killed the patient, it invaded the lungs, whence it was able to spread to the other victims with ease.

Lessons to learn from this experience:

1. Never forget plague when buboes and fever occur. The disease is global and can invade human populations at any time.
2. Never incise a bubo of a plague patient (proved or suspected). The patient may possibly develop pneumonic plague and die.
3. Never forget the rapidity with which plague spreads and kills.

Other lessons:

1. Never give an intravenous antimicrobial to a plague patient. Bacteria are killed in such numbers that an enormous amount of toxin, released by lysis, pours into the bloodstream, usually killing the patient. Recommended treatment is 1 gram of streptomycin daily or 1 gram sulfadiazine per day.
2. Most outbreaks are small and sporadic. (See USN Medical News Letter, Vol. 37, No. 10, 19 May 1961). Successful handling of these outbreaks usually requires only DDT dusting of rodent trails and prophylaxis for contacts with small daily doses of sulfonamides.
3. Plague vaccine prepares for the next epidemic, not the one at hand, unless immunizations have been given some months previously. A minimum of 2 injections is required and they must be no less than 30 days apart. Good protection requires a booster in 3 to 6 months.

4. Epidemic bubonic plague, in which large numbers of a population are affected at once, is usually spread by human parasites—human fleas and human lice. Domestic rats may suffer in a simultaneous epizootic, but often human plague occurs when these rats are not affected. ¹.

That in the United States for the period July 1959 - June 1961, loss of work time averaged 322.9 million days a year for the usually employed population aged 17 and over? Five and one-half days a year per employed person, about 1/3 of loss time, was due to acute respiratory diseases. ².

That at present, the whole of West Jordan, the Jordan Valley, and the northern area of East Jordan are free from malaria and only consolidation work is being done there? This year, 92% of the 950,000 persons under risk of malaria in the country will be in areas where malaria transmission has been eliminated and only 77,000 will still need protection by attack measures. ³.

That Ecuador was one of the first countries to attempt to eradicate malaria, the prevalence of which is now sufficiently reduced to enable the population to live and work in the previously malarious zones, which are the most productive in the country? ⁴.

That at the present rate of progress, malaria should be eradicated from Europe in 1962 and from the Americas and a large part of Asia and Africa in another 10 years? ⁵.

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RESERVE**SECTION**

Wearing of Uniforms by Retired
and Naval Reserve Personnel *

Retired Personnel

1. Retired officers and enlisted personnel, not on active duty, shall be entitled to wear the prescribed uniform of the grade or rating held on the retired list when the wearing of the uniform is considered to be appropriate.
2. They are prohibited from wearing the uniform in connection with nonmilitary activities of a business nature.
3. Retired personnel not on active duty residing or visiting in a foreign country, shall not wear the uniform except when attending, by formal invitation, ceremonies or social functions at which the wearing of the uniform is required by the terms of the invitation or by the regulations or customs of the country.
4. The uniform shall conform with these regulations, except that in pattern their uniforms and equipment may be either as prescribed herein or at the time of their retirement.
5. If retired personnel are ordered to active duty, they shall wear the uniform prescribed for officers and enlisted personnel, respectively, on active duty.

Reserve Personnel

1. Officers and enlisted personnel of the Naval Reserve not on active duty shall wear the uniforms of their grade or rate when:
 - a. Associated with or attached to a Selected Reserve Unit of the Naval Reserve and attending a drill.
 - b. Associated with or attached to a Specialist Reserve Company, Naval Reserve Officers School or Composite Company in a pay status and attending a drill.
 - c. Performing active duty for training with or without pay and the necessary travel in connection therewith.
 - d. Performing duties under appropriate duty with pay orders and the necessary travel in connection therewith.
2. Officer and enlisted personnel of the Naval Reserve not on active duty may wear the prescribed uniform of their grade or rating on occasions of ceremony as follows:
 - a. Any person who has served honorably in the Army, Navy, Air Force, or Marine Corps of the United States during war, and whose most recent service

was terminated under honorable conditions, shall, although not in the active military service of the United States, be entitled to wear the uniform of the highest grade held during his or her war service upon the following occasions of ceremony:

(1) Military funerals, memorial services, and inaugurals.

(2) Patriotic parades on national holidays, or other military parades or ceremonies in which any active or reserve United States military unit is taking part.

The following prohibitions against wearing the uniform shall apply to reservists on inactive duty:

a. Wearing of the uniform is prohibited -

(1) At any meeting or demonstration which is a function of, or sponsored by, any organization, association, movement, group, or combination of persons which the Attorney General of the United States has designated as totalitarian, fascist, communist, or subversive, or as having adopted a policy of advocating or approving the commission of acts of force or violence to deny others their rights under the Constitution of the United States, or as seeking to alter the form of government of the United States by unconstitutional means.

(2) In connection with nonmilitary activities of a business or commercial nature.

(3) Under any circumstances which would tend to bring discredit or reproach upon the uniform.

3. Officers of the Naval Reserve not on active duty may wear the uniform of their grade when engaged in the instruction of a cadet corps or similar organization at approved naval or military academies or other approved institutions of learning.

4. Reserve personnel not on active duty residing or visiting in a foreign country shall not wear the uniform except when attending, by formal invitation, ceremonies or social functions at which the wearing of the uniform is required by the terms of the invitation or by the regulations or customs of the country.

5. If Reserve personnel are ordered to active duty, including active duty for training, they shall wear the uniforms prescribed herein for officers and enlisted personnel of their respective grade or rating. (to be contd.)

* (From: U. S. Navy Uniform Regulations)

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Objectives of Navy Ensign "1915" Medical Program

The primary objectives of this program are to provide (1) an opportunity for qualified medical students to affiliate with the Naval Reserve as commissioned officers while still in medical school; (2) assurance that these officers will be able to complete their medical studies and internship prior to fulfilling their obligation for active military duty; (3) assurance that when they do enter service it will be with the Navy's Medical Department; and (4) a primary source of qualified candidates for the Naval Intern Program and for the Medical Corps of the Navy and Naval Reserve.

A Note from "Navy Ensign Medical Program," NavMed P-7075

"The terms 'Military Medicine' and 'Civilian Medicine' no longer represent widely separated spheres of professional endeavor. Both are conducting clinical and laboratory research of inestimable value to the future health and welfare of our country. Similarly, their cooperation and well-coordinated efforts are responsible for greatly improved methods of caring for mass casualties resulting either from civil disaster or modern warfare.

The Ensign Medical Program was evolved to permit the affiliation of medical students with the Naval service at an early stage in their careers, thus enabling them to benefit by this broader concept of the role of today's medical profession. "

s/ E. C. KENNEY
Rear Admiral, MC,
Surgeon General, U. S. Navy

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